

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 94 30 1680

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Application Number
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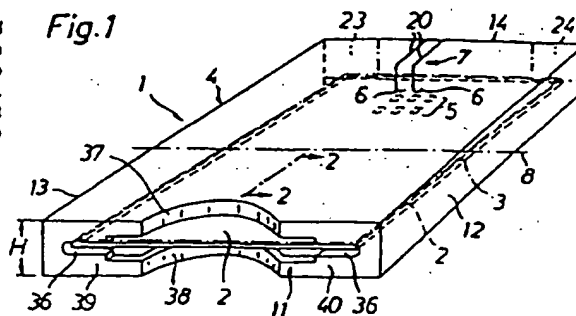
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(54) Contacting apparatus for a chip-card.

(57) A contacting apparatus (1) for a chip-card (2) having card contacts (5) adapted for being brought into contact with the contacting apparatus. A card support (3), which is adapted to receive the chip-card, is movably supported in a housing (4). Card contacts (5) can be brought into contact engagement with contact elements (6) which are stationary with respect to the housing (4).

Fig.1



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EUROPEAN PATENT APPLICATION

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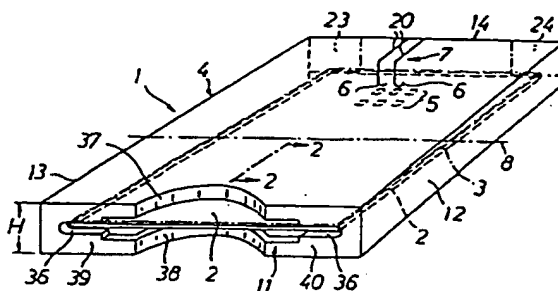
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④⑥ Contacting apparatus for a chip-card.

④⑦ A contacting apparatus (1) for a chip-card (2) having card contacts (5) adapted for being brought into contact with the contacting apparatus. A card support (3), which is adapted to receive the chip-card, is movably supported in a housing (4). Card contacts (5) can be brought into contact engagement with contact elements (6) which are stationary with respect to the housing (4).



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DESCRIPTION

CONTACTING APPARATUS FOR A CHIP-CARD

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

5 The invention is directed to a contacting apparatus for a chip-card.

DESCRIPTION OF THE PRIOR ART

10 A chip-card is a generally rectangular card made of plastic material. A microelectronic component, called a chip, is arranged within the card. The chip can be in the form of a storage means for information. Different types of information may be contained in the chip. The information may comprise, for instance, information about the owner of the card or information relating to financial data. In general, the contacting apparatus for a chip-card comprises a number of contact elements which are adapted to engage card contacts, i.e. contacts which are provided on the chip-card. The card contacts are connected with the chip. The contacting apparatus is used together with electronic apparatus for retrieving information from the chip or for storing information in the chip.

20 In a known contacting apparatus, the contacting elements forming a set of contact elements are adapted to be pivoted towards the card contacts after the card is moved into the contact apparatus. This known design requires a flexible connection between the movable set of contact elements and the contact apparatus per se, i.e. a cable must be provided between the movable set of contact elements and, e.g. the housing of the contacting apparatus so as to allow for the movement of the set of contact elements.

30 It would be desirable to provide an improved contact apparatus which allows the contacting of the card contacts such that the contact surfaces of the card contacts are not subject to wear due to friction.

It would also be desirable to provide a contacting apparatus which provides for an automatic locking of the card during an operation in which information is read from the card.

5 Furthermore it would be desirable to provide a contacting apparatus such that the card contacts can be contacted a large number of times without the occurrence of faulty contact engagements.

10 In addition, it would be desirable to provide a contacting apparatus which allows a large number of contact engagements; for instance, up to 500,000 contact engagements with the card contacts should be possible. This would be equivalent to a life expectancy of between 2 to 3 years.

15

SUMMARY OF THE INVENTION

In accordance with this invention, there is provided a contacting apparatus for a chip-card, the chip card comprising card contacts adapted for being brought into engagement with the contacting apparatus, 20 the contacting apparatus having a housing and card support means adapted to receive the chip-card. The card support means is movably supported in the housing in such a manner that the card contacts can be brought into contact engagement with contact elements which are stationary with respect to the housing. 25

The present invention thus provides a contacting apparatus for a chip-card comprising card support means, referred to as card guide means, the card support means being arranged such that it can be moved together with 30 the card into a reading position in which the card contacts may be brought into contact engagements with stationary contacts, the stationary contacts being mounted, for example, at the housing of said contact apparatus.

35

Preferably, the movement of the card guide means from a card insert position to a card reading position is a pivotal movement of the card guide means together

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Fig
arrangement
Fig

with the card which is held in the card guide means. Also, preferably the card which is of substantially rectangular shape is inserted into the card guide means with a narrow side of the card first. The card is either totally inserted or inserted at least for half of its length, whereupon the card guide means is pivoted about a transverse axis which extends transversely with respect to the longitudinal axis of the card.

BRIEF DESCRIPTION OF THE DRAWINGS

10 Figure 1 is a schematic isometric view of a contacting apparatus of the invention.

Figure 2 is a schematic longitudinal cross-sectional view along line 2-2 in Figure 1, showing a slightly modified embodiment.

15 Figure 3 is a schematic plan view of the chip-card.

Figure 4 is a schematic longitudinal cross-section substantially along line 2-2 in Fig. 1 showing the card guide means in the card insert position.

20 Figure 5 is a sectional view similar to the sectional view of Figure 4 with the card guide means being shown in its reading position.

25 Figure 6 is a longitudinal cross-sectional view substantially along line 2-2 Figure 1 of another embodiment, with the card guide means being in the card insert position.

Figure 7 is a sectional view of similar to Figure 6 with the card guide means of Figure 3 being in the card reading position.

30 Figures 8-11 are schematic partial cross-sectional views of the different positions of the card guide means, positions which will be assumed by the embodiments of Figures 4-7.

35 Figure 12 is a schematic representation of the contacts located at the housing of the contacting apparatus.

Figure 13 is a circuit which can be realized with the contact arrangement shown in Figure 12.

Figure 14 is a schematic representation of another arrangements of the stationary contacts.

Figure 15 is a circuit which can be realized with the contact arrangement of Figure 14.

Figure 16 is a cross-sectional view of the stationary contacts and components thereof.

Figure 17 is a partial cross-sectional view of Figure 16 showing a different contact shape which is useful for realizing the circuits of Figures 13 and 15.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention relates to a contacting apparatus 1 adapted to provide contacting engagement with a chip-card 2. As is well known, a chip-card is generally a card made of plastic material including a microelectronic chip, for instance, an information storage means.

Initially, a first embodiment of a contacting apparatus 1 will be described while referring to the extremely schematic representations of Figures 1 to 3. Within the contacting apparatus 1, card support means 3 is provided. Card support means 3 will be referred to below as card guide means. Card guide means 3 is movably mounted within contacting apparatus 1 in such a manner that a chip-card 2 being placed on card guide means 3 and having card contacts 5 can be brought into engagement with stationary contact elements 6. Generally, contact elements 6 are mounted on contacting apparatus 1. Preferably, contact elements 6 are mounted on a housing 4 and form altogether a set 7 of contact elements. Mounting means 20 is used for mounting contact elements 6 on housing 4. Set 7 of contact elements will be discussed in detail below. As is quite evident, an exchange of information between the chip of the chip-card and an apparatus connected to contact elements 6 can occur in a situation where contact elements 6 are in engagement with card contacts 5.

Housing 4 comprises a front wall (apparatus panel)

11, a right side wall 12 and a left side wall 13 as well as a back wall 14, an upper wall 15 and a bottom wall 16. Housing 4 of contacting apparatus 1 of the invention is relatively small. For instance, the height H is 14mm, the length L is 91mm and the width W is 66mm.

5 In the embodiment shown, front wall 11 comprises an insert slot 36 through which card 2 may be moved into the interior of contacting apparatus 1. When card 2 is inserted into contacting apparatus 1, the card will be received by card guide means 3 which is aligned with insert slot 36. In accordance with a preferred embodiment of the invention, card guide means 3 is pivotably mounted preferably about a pivot axis 8 which extends transversely with respect to the direction in which the card is inserted (insert direction). Pivot axis 8 is located in a position approximately in the middle of an inserted card 2. Preferably, the card is inserted into the insert slot 36 starting with the narrow guide or edge of the card. The pivotable support of the card guide means 3 will be described in detail below.

For the embodiment of Figures 1 and 2, the insert operation of card 2 occurs in a direction which is slightly inclined in the downward direction, as can be recognized by the position of card 2 shown in Figure 2. For reasons of clarity, Figure 2 does not show the card guide means. However, card guide means 3 is located below card 2. In Figure 1, the shape of card 2 is only shown by a dotted line, while card guide means 3 is represented by two lines, each of which is dashed. On the other hand, Figure 2 shows card 2 with solid lines in the insert position, and the dashed representation of card 2 shows the card in the reading position. In Figure 1, card guide means 3 as well as card 2 are still in the insert position, i.e. card 2 was inserted but is not yet in the reading position still to be described.

In order to simplify the insertion of card 2 into

card guide means 3, front wall 11 is provided with an upper finger recess 37 and preferably also with a lower finger recess 38, so that substantially only a left front wall 39 and a right front wall 40 extend forwardly and are arranged in a common plane.

5 Due to the rotary or pivotal mounting of card guide means 3, the possibility exists that contact elements 6 of set 7 of contact elements can be arranged in a stationary manner adjacent to card guide means 3 and chip-card 2 supported by card guide means 3,
10 respectively, such that only after card 2 is moved with respect to contact elements 6, the connection (engagement) between contact elements 6 and card contacts 5 is provided.

15 In accordance with the present invention, detent or locking means are provided for locking card guide means 3 in an insert position and/or a reading position. This will be explained in detail below by referring to Figures 4 and 5.

20 Reference will now be made to Figure 3 which discloses a schematic representation of a part of housing 4 with a chip-card 2 being inserted. Chip-card 2 is provided at its upper surface 18 with card contacts 5 which are individually referred to by reference numerals C1 to C8. Adjacent to contacts 5, a flat cable
25 34 (see Figure 3) is shown in a cross-sectional representation. The individual wires of flat cable 34 are referred to by reference numerals S2, S1 and C1 to C8. The allocation of the wires of flat cable 34 with respect to card contacts 5 will be discussed below in
30 connection with Figures 12 to 15.

35 Summarizing the embodiments of Figures 1 to 3, it may be said that the rotary mounting of the card guide means within housing 4 together with a fixedly mounted set 7 of contact elements makes it unnecessary to provide for a flexible termination (connection) of set 7 contact elements.

Another embodiment will be described in connection

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with Figures 4 and 5. In substance, this embodiment is a further development of the embodiment of Figures 1 to 3. Therefore, reference numerals similar to the reference numerals of the embodiment of Figures 1 to 3 are used in Figures 4 and 5. The main distinction
5 between the embodiment of Figures 4 and 5 and the embodiment of Figures 1 to 3 resides in the fact that card guide means 3 of Figures 4 and 5 extends in its insert position, shown in Figure 4, substantially horizontally, while the card guide means of Figure 5
10 extends in its reading position in a slightly inclined manner, with the inclination going upwardly towards the left. Figures 4 and 5 show detent or locking means already mentioned at 21 and further spring means in the form of a leaf spring 32 is provided so as to bias the
15 card guide means into a direction towards stationary contact elements 6.

The detent or locking means 21 comprises a first detent element in the form of a detent spring 24 and a
20 second detent element in the form of a detent edge 25. Detent spring 24 is a leaf spring. In practice, as is shown in Figure 1, two leaf springs 23 and 24 may be used and are mounted to the housing (or the frame) 4 of contacting apparatus 1. Detent edge 25 is provided at
25 card guide means 3 and forms an abutment surface 42 on which the bottom edge 41 of detent spring 24 may abut. Similar explanations hold true when two detent springs 23, 24 are used as is shown in Figure 1.

Figure 4 illustrates card guide means 3 in the insert position, i.e. extending perpendicularly with
30 respect to the vertical line 43. In the insert position, the insert opening (referred to by reference numeral 30 in Figure 5) of card guide means 3 is aligned with insert slot 36 of front wall 11. In the representation of Figure 4, card 2 is not yet completely
35 inserted into card guide means 3. In Figure 5, however, card 2 has pushed detent spring 24 off abutment surface 42 during the movement of card 2 towards an end abutment

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33 which is shown in Figure 8 and will be described in detail below. Since detent spring 24 was pushed off abutment surface 42, a pivotal movement of card guide means 3 into the position shown in Figure 5 was possible. During said pivotal movement about an angle α between the vertical 43 and a line 44 in Figure 5, insert opening 30 is made inaccessible. This is done by having insert opening 30 disappear behind cover means 46 provided by the front wall 11 (see Figure 5).

Spring means in the form of a leaf spring 32 maintains card guide means 3 in the reading position of Figure 5. The spring means is provided at the housing or preferably at bottom wall 16. In the reading position stationary contact elements 6 are in engagement with card contacts 5.

The force required to pivot card guide means 3 from the position of Figure 4 to the position of Figure 5 is primarily provided by the user. After the user has inserted the card, he will hold the card between his thumb and index finger and move the card together with card guide means 3 downwardly. Leaf spring 32 may assist in this movement.

The cross-sectional views of Figures 6 and 7, disclose the insert position and reading position, respectively, of another embodiment of the invention. The embodiment of Figures 6 and 7 differs from the embodiment of Figures 4 and 5 only in so far as the embodiment of Figures 4 and 5 does not require a physical transverse rotary axis or shaft. In Figures 6 and 7 the transverse rotary axis is provided for by a tensioning web 50. Tensioning web 50 is mounted on the one hand at bottom wall 16 and on the other hand at the lower surface of card guide means 3. Moreover, locking means in the form of a lever 51 is mounted in housing 4 in such a manner that the locking means can cooperate with the forward edge of card guide means 3 which is located adjacent to insert slot 36.

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Figure 8
Figure 7

Primarily, tensioning web 50 provides for the rotary or pivotal mounting of card guide means 3 as was true for the embodiment of Figures 4 and 5. The transverse rotary axis 89 corresponds in this respect to the transverse rotary axis 8. This mounting allows for a pivotal movement about the angle α between the vertical 43 and line 44 in Figure 7, i.e. between an insert position and a reading position. Again, as in the reading position of Figure 7, the access to insert opening 30 of card guide means 3 is blocked as was true for the embodiment of Figure 5.

In Figure 6 tensioning web 50 is shown as being bent in its left hand part. In this position, tensioning web 50 biases card guide means 3 towards the insert position of Figure 6, so that opening 30 and insert slot 36 are aligned. When card 2 is completely inserted into card guide means 3 then for a completely inserted card 2 the detent or locking means 21 are released with the consequence that the user may pivot card guide means 3 together with card 2 into the reading position shown in Figure 7. Consequently, locking means 51, which is not in engagement with card guide means 3 in the position shown in Figure 6, will pivot and come into engagement with card guide means 3 so as to hold card guide means 3 in the reading position of Figure 7. If it is desired to move card guide means 3 from the reading position of Figure 7 again into the insert position of Figure 6, then the user manually rotates locking lever 51 counterclockwise (see Figure 7) so far that card guide means 3 is released by the locking means 51. The tensioning web 50 will then return card guide means 3 into the insert position of Figure 6 with the detent or locking means 21 being reengaged.

Referring to Figures 8 to 11, the detent or locking means 21 and its function will be described in detail for a contacting apparatus shown in Figures 4 and 5, and Figures 6 and 7, respectively.

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In Figure 8 card guide means 3 is shown in its horizontal insert position. It should be noted that in Figure 8 only one of the two locking means disclosed in Figure 1 is shown. The locking or detent means is provided in the form of a detent spring 24. Detent spring 24 engages by means of its bottom edge 41 the upper surface of card guide means 3. In the area of detent spring 24 (and also 23) card guide means 3 is designed in such a manner that an abutment means surface 52 is formed which extends abruptly in a downward direction. As is shown in Figure 8, an abutment surface 33 is formed by card guide means 3 for card 2, abutment surface 33 being located a small distance from detent spring 24 in its detent position.

Therefore, if the card, as is shown in Figure 9, is moved into the card guide means, the card will firstly encounter the lower ends of detent spring 24 (and 23) and push said ends off abutment surface 42 of the detent means 25 so that the disengaged position of the detent means shown in Figure 9 is reached. When the movement of card 2 in the insert direction continues, the card will eventually abut at end abutment 33. Inasmuch as detent spring 24 (the same is true for detent spring 23) is no longer in an abutting relationship with abutment surface 42, card guide means 3 can be pivoted into the reading position of Figure 10. During this pivotal movement, the abutment surface 53 of detent spring 24 will come into engagement with the abutment means surface 52 (for the embodiment of Figures 4 and 5, this pivotal movement is carried out with the assistance of pressure spring 32). In the reading position, card contacts 5 are held in contact engagement with stationary contact elements 6.

In Figure 11 the card removal position is shown. To bring card guide means 3 into the card removal position, the user grips and pivots the card guide means and the card. During this pivotal movement, detent spring 24 will return to its position shown in Figure

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8. Due to the movement of detent spring 24 (and 23) chip-card 2 will be automatically pushed out of the insert slot by a corresponding distance.

Referring to Figures 12 to 17, set 7 of contact elements as provided by the invention will be discussed together with the possibilities of connecting set 7 with a flat cable 34.

Figures 12 and 14 are schematic representations of the arrangement of stationary contact elements 6 (fixedly mounted to the housing) which form a set 7 of contact elements. Inasmuch as card 2 comprises altogether eight card contacts C1 to C8, a corresponding number of contact elements 6 is provided and reference numerals 61 to 68 refer to said contacts. Contact element 61 is adapted for providing a connection to card contact C1. Contact element 65 is adapted to provide a connection to card contact C5, etc. For termination of flat cable 34 as shown in Figure 2, contacts 61 to 68 are provided at their ends with insulation displacement means 71.

In accordance with the invention, the set of contact elements further comprises two additional contact elements 60 and 69, each of which is provided with insulation displacement means. Contacts 60 and 69 may be used to realize the circuits shown in Figures 13 and 15. The circuit of Figure 13 is realized with the two contact elements 60 and 69. The contact elements 60 and 69 of Figure 14 are used to realize the circuit of Figure 15.

Before describing the circuits of Figure 14 and 15 in detail, the design of the contact elements as shown in Figure 16 and 17 will be explained.

Figure 16 is a schematic longitudinal sectional view along lines 12-12 in Figure 12.

Figure 16 discloses an insulation body 78 adapted to receive individual contact elements 61 and 65. Insulating body 78 comprises an insulating plate 79 which is mounted by means (not shown) on the housing of

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card guide means 3. Flat cable 34 is arranged on the upper surface of insulating plate 79. In its position shown in Figure 16, flat cable 34 is already pressed into insulation displacement means 71 by means of clamping means 83. The other end of flat cable 34 is connected to an electronic apparatus for retrieving and/or storing information.

Abutment walls 84 project away from the lower edge of insulating plate 79. Centrally located on insulating plate 79 is a wall 82 which separates the two rows 61-64 and 65-68, respectively, of the contact elements. At the lower end of wall 82, abutment means 81 extends transversely. Abutment means 81 is adapted for cooperation with contact elements yet to be described, for instance, with contact elements 61 and 65 of the two groups of contact elements. Supporting members 80 maintain contact elements 61-65 in their position and are fixedly mounted to insulating plate 79 by means not shown.

Contact elements 61 and 65 are representative for the remaining contact elements and they are of a generally U-shaped design. The bight portion of the "U" extends around the supporting means 80. Both groups of contact elements separated by wall 82 are of symmetric design. Contact elements 61-65 rest with their free ends with a springy characteristic on abutment 82. Adjacent to the free ends, contact elements 61-65 are provided with contact projections 85 which serve for contacting and/or engagement with the upper surface of card contacts 5 and the card itself. In the right hand part of Figure 16, there is shown how card 2 is in contact with contact element 65. Contact element 65 will be lifted from the abutment 81 and will, due to its inherent spring force, press against the card contact which is located there. In the left hand side of Figure 16, the rest position is shown for contact element 61.

In accordance with the invention, the design of the contact elements 60 and 69 is as follows. As is shown

in Figure 17, contact element 69 corresponds in its design to contact element 61. However, contact element 60 is of a design different from the design of contact element 65 which is also shown in Figure 17 for comparison purposes. Contact element 60 does not have a contact projection 85 as is shown in Figure 16, but contact element 60 is prolonged and extends through an opening in wall 82 so as to end adjacent to the upper surface of contact element 69. The opening in wall 82 is large enough so as to provide for a sufficient space allowing the movement of contact element 60. Keeping this description in mind, one recognizes that for a completely inserted card 2, contact element 69 provides for a connection to contact element 60. The inserted card 2 therefore causes the closing of the two contact elements 69 and 60 and it can be said that the two contact elements 69 and 60 form a switch 74. It should be noted that the differently shaped contact element 60 may be manufactured from the same sheet material from which the other contact elements are manufactured. The differently shaped contact element 60 is simply bent in a different manner as was pointed out above.

As mentioned, contact elements 60 and 69 form, for all practical purposes, a switch which is open when no card 2 is inserted and which is closed when the card is inserted. Switch 74 is used in the two circuits shown in Figure 13 and 14, respectively.

The circuit 72 as shown in Figure 13 may be used to provide an indication of the condition of operation. For example, a light emitting diode 73 may be used to indicate to the user the condition of complete insertion of card 2. For this purpose, the two wires S1 and S2 of the flat cable are connected to a voltage source (not shown). As soon as card 2 is completely inserted, switch 74 closes in a manner described in connection with Figure 17, and the light emitting diode 73 of circuit 72 starts to emit light. For a realization of this circuit, one wire S1 is directly connected with

light emitting diode 73, while the other wire S2 is connected to switch 74 formed by contact elements 69 and 60. As is shown in Figure 12, this can be done by introducing the wire S2 into the insulation displacement means which is located on the same level, with the wire being interrupted in between.

For the circuit 76 of Figure 15, the two wires S1 and S2 are guided to the two appropriate insulation displacement means 71 which are offset with respect to each other. The closing condition and the opening condition, respectively may be sensed by switch 74 via said wires S1 and S2.

The above description of the embodiments explains the movement of the card guide means from an insert position into a reading position by a manual operation of the user. Similarly, the return of the card guide means from the reading position to the insert position is manually carried out by the user. However, it is also possible to use a solenoid activated return movement into the insert position instead of the manual return of card guide means 3. It would be similarly possible to use a solenoid activated pivotal movement of the card guide means from the insert position to the reading position.

For the so-called manual contact element engagement technique, the rotary movement of the card guide means initiated by hand occurs against the force of the tensioning or bearing band (tensioning web) 50 which acts as a reset spring and also against the force of contact elements 6 as is shown in Figures 6 and 7. For the embodiment of Figures 4 and 5, the rotary movement of card guide means 3 initiated by hand occurs for all practical purposes only against the force of contact elements 6 with spring 32 assisting in said rotary movement.

In the reading position of the embodiment of Figures 4 and 5, card guide means 3 will be held in its contact position due to the force of spring 32. For the

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embodiment of Figures 6 and 7, the locking of the card guide means in the reading position is effected by lever 51.

In order to return the card guide means from the reading position into the insert position, a release operation must be carried out. For the embodiment of Figures 4 and 5, the user effects the movement back into the insert position while, for the embodiment of Figures 6 and 7, web 50, which acts as a reset spring, will effect the return movement into the insert position.

According to embodiments not shown, it is also possible to initiate the rotary movement of the card guide means from the insert position to the reading position by means of an actuating lever which will be locked in the reading position. For the return movement, the locking means will be released and a reset spring returns the card guide means into the insert position. According to another possibility, a card guide means could be provided having the rotary axis located at the edge of the card, and the actuating lever makes it impossible to remove the card in the reading position by carrying a plate which will close the insert opening in the reading position.

lever
card
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CLAIMS

1. A contacting apparatus (1) for a chip-card (2),
said chip-card comprising card contacts (5) adapted for
being brought into contact with said contacting
5 apparatus, said contacting apparatus being characterized
by a housing (4), and card support means (3) adapted to
receive said chip-card, said card support means (3)
being movably supported in said housing (4) in such a
manner that said card contacts (5) can be brought into
10 contact engagement with contact elements (6) which are
stationary with respect to said housing (4).

2. The contacting apparatus of claim 1,
characterized in that said card support means is formed
by card guide means (3), said card guide means being
15 pivotally mounted within said contacting apparatus about
a transverse rotary axis (8).

3. A contacting apparatus as set forth in one or
more of the preceding claims, characterized in that said
card guide means (3) is pivotally mounted between an
20 insert position and a reading position by means of
detent means (21).

4. The contacting apparatus of one or more of the
preceding claims, characterized in that after carrying
out the pivotal movement of the card guide means from
25 the insert position into the reading position, a card
removal blocking means becomes effective which will
block the removal of said card (2) from said contacting
apparatus (1).

5. The contacting apparatus of one or more of the
30 preceding claims, characterized in that fixed abutment
means (33) is provided at said card guide means (3) for
defining the end position of said card (2) in said card
guide means (3) and that during the insert operation of
the said card (2) into said card guide means (3), said
35 detent means (21) will be released prior to said card
reaching said abutment (33), so as to allow a pivotal
movement of said card guide means together with said

card.

6. The contacting apparatus of one or more of the preceding claims, characterized in that an insert opening (30) for the card guide means (3) is blocked by cover means (46) when said card guide means is in the reading position.

7. The contacting apparatus of one or more of the preceding claims, characterized in that the card guide means (3) is in its insert position in a horizontal position substantially parallel to an upper wall (15) and/or a bottom wall (16) of the housing of said contacting apparatus, while said card guide means (3) in the reading position takes a position in which the end of the card, further inserted into said contact apparatus (1), is pivoted towards said upper wall (15).

8. The contacting apparatus of one or more of the preceding claims, characterized in that said detent means (21) comprises a first detent element in the form of a detent spring (24) designed as a leaf spring, said detent means (21) further comprising a second detent means in the form of a detent edge (25), said detent edge (25) being provided at said card guide means (3).

9. The contacting apparatus of one or more of the preceding claims, characterized in that said contact elements (6) are fixedly mounted at said housing (4) by means of an insulating body (78) which forms a wall (82), said wall separating two rows (61-64 and 65-68) of contact element rows, and wherein an abutment (81) is provided at said wall (82) and extends in transverse direction, said abutment (81) being used as an abutment for said contact elements (6).

10. The contacting apparatus of one or more of the preceding claims, characterized in that said contact elements (6) are generally U-shaped and said contact elements are in biased engagement with said abutment (81).

11. The contacting apparatus of one or more of the preceding claims, characterized in that said contact

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elements provide contact element bights (85), said bights being used for contacting the upper surfaces of said card contacts (5) or the card itself, wherein said bights are lifted from said abutment (81) in case that a contacting engagement with said card contacts (5) occurs.

12. A contacting apparatus of one or more of the preceding claims, characterized in that two contact elements (60, 69) form a switch, said switch being open when no card (2) is insert and being closed when a card (2) is inserted.

13. The contacting apparatus of one or more of the preceding claims, characterized in that said contact elements (6) which are fixedly mounted at the housing are in the form of a set (7) of contacts and are provided with insulation displacement means (71), said contact elements (6) being connected to a flat cable (34) via said insulation displacement means (71).

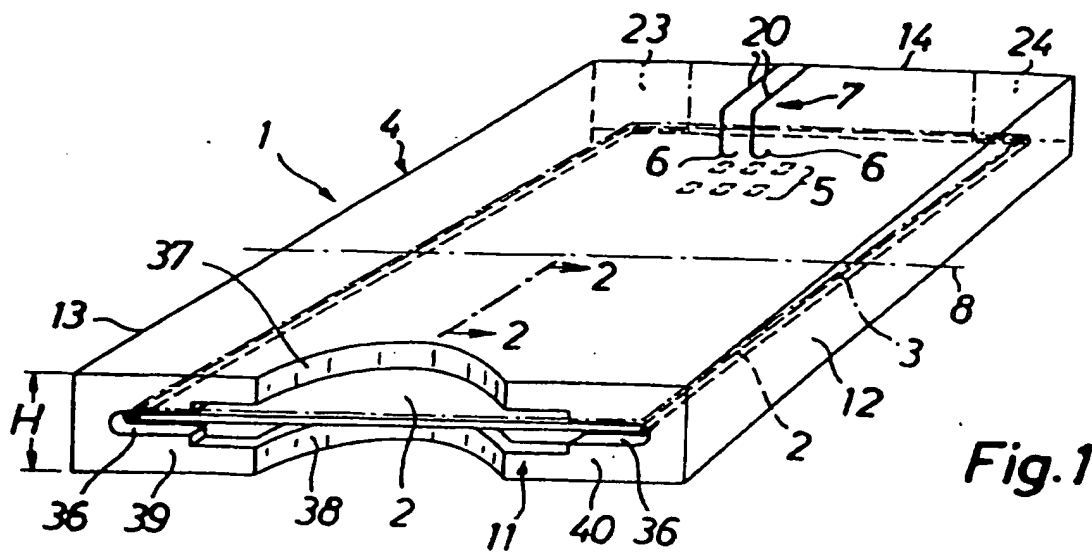


Fig. 1

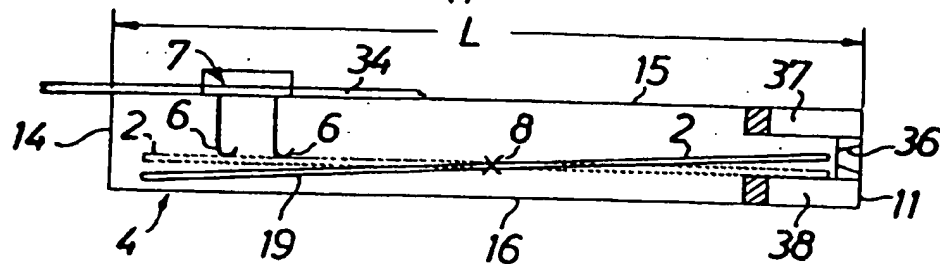


Fig. 2

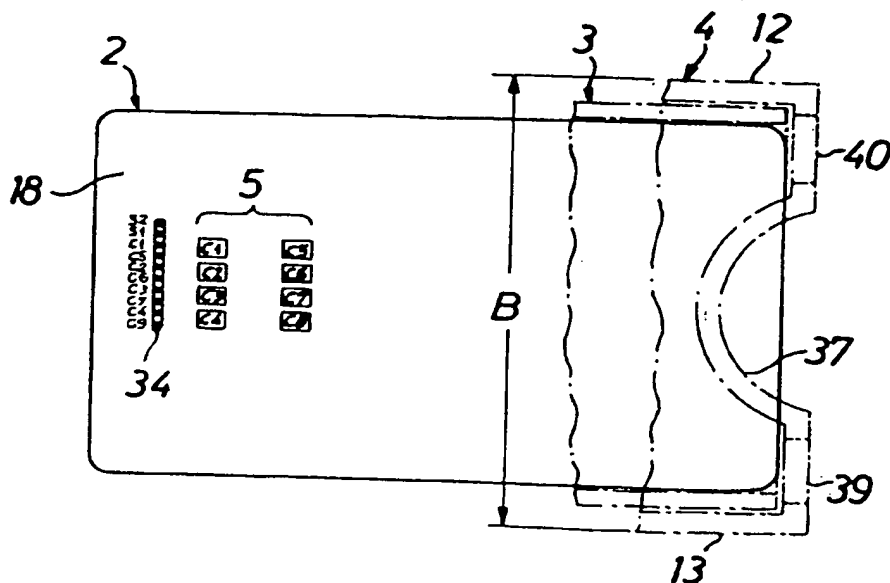


Fig.3

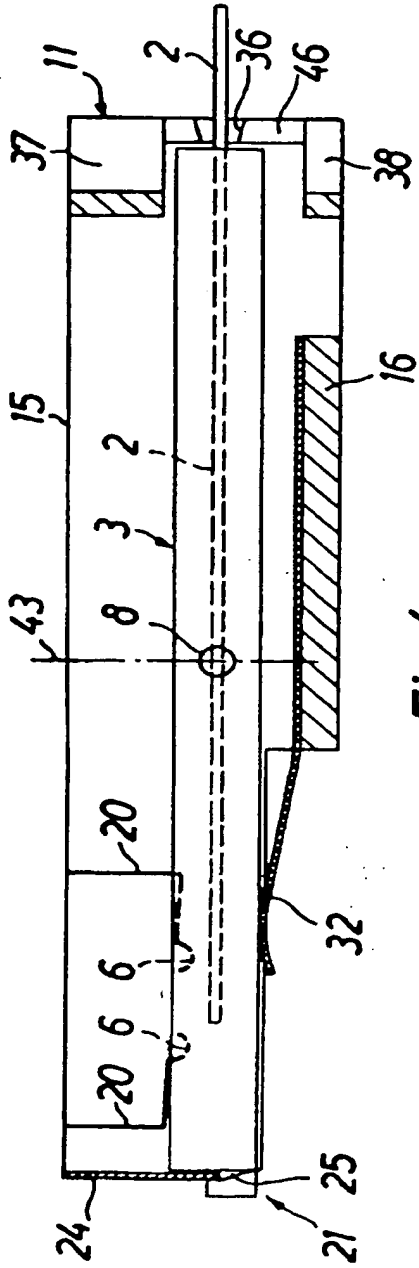


Fig. 4

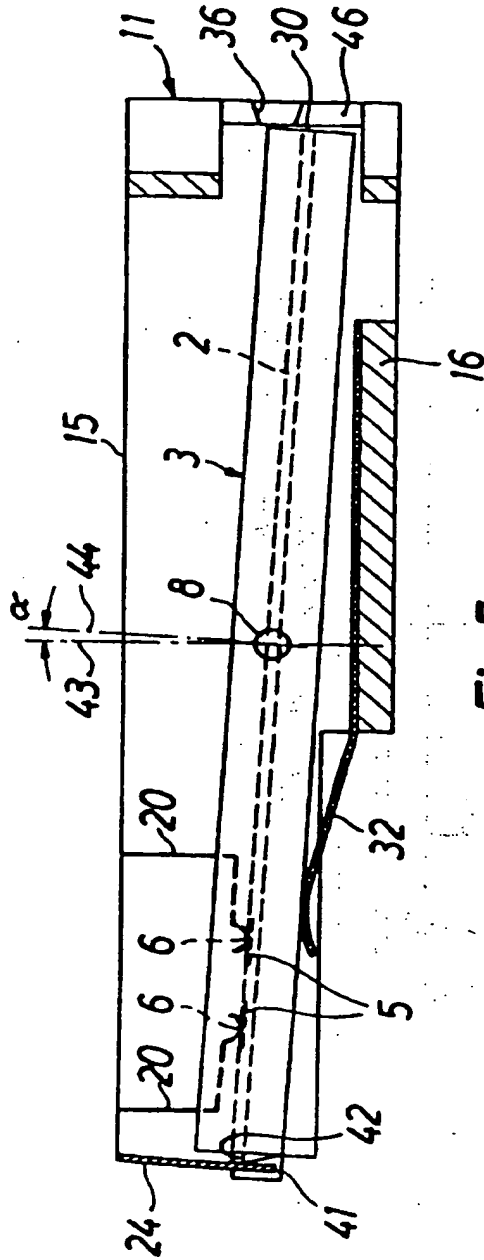


Fig. 5

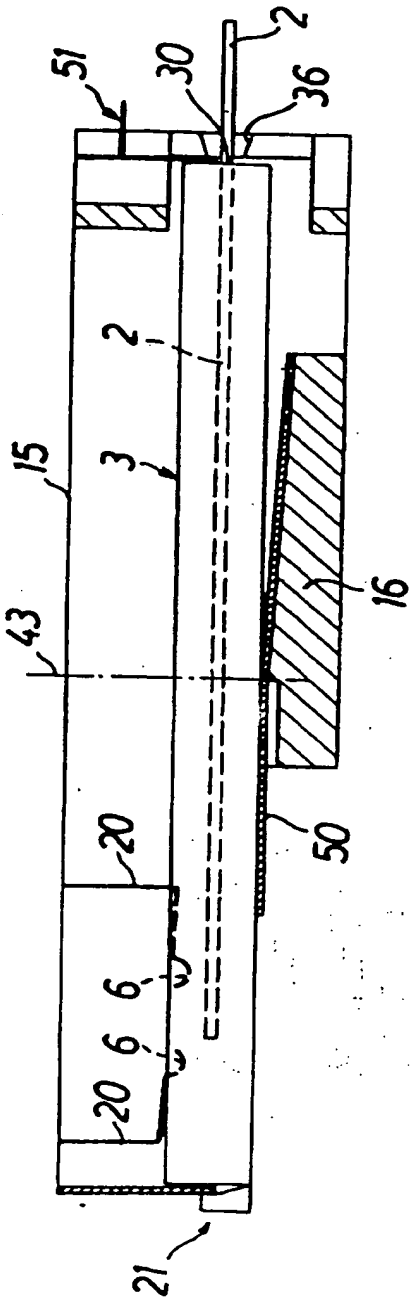


Fig. 6

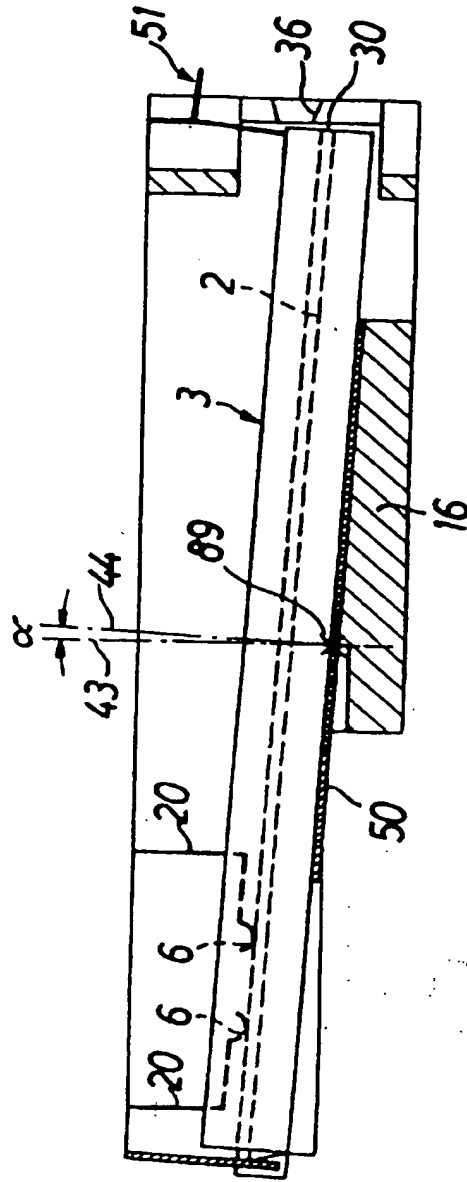


Fig. 7

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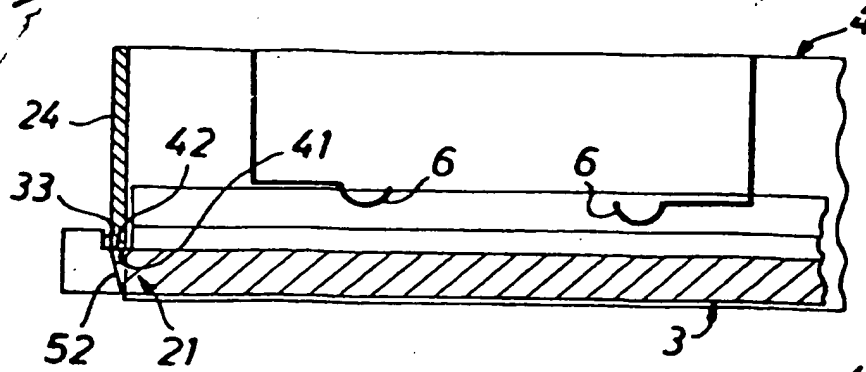


Fig. 8

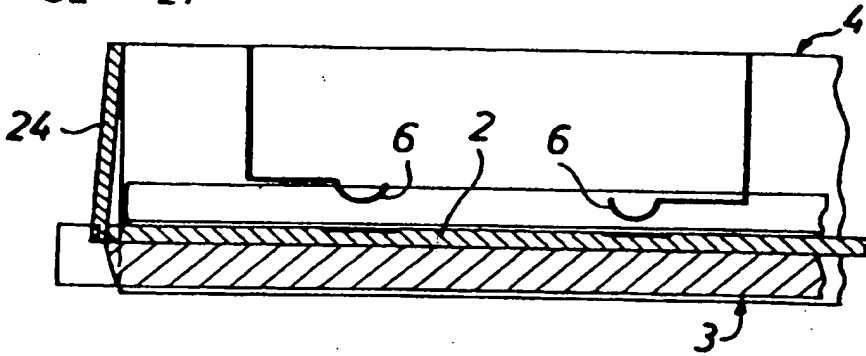


Fig. 9

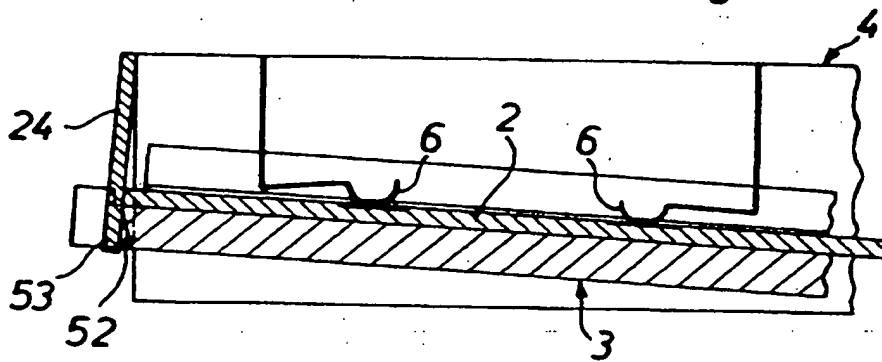


Fig. 10

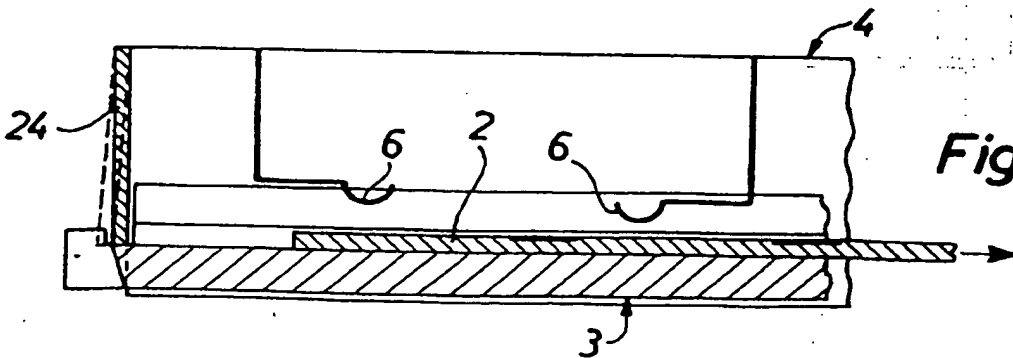


Fig. 11

